FINAL AMENDMENT TO THE ENVIRONMENTAL ASSESSMENT

BIRD DAMAGE MANAGEMENT AT MUNICIPALITIES, INDUSTRIAL SITES,

AGRICULTURAL SITES AND PRIVATE LANDS WITHIN INDIANA

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I. INTRODUCTION

In 2002, the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) completed an environmental assessment (EA) on alternatives for the management of conflicts and damage cause by birds in Indiana (USDA 2002*a*)[1]. The EA's Decision and Finding of No Significant Impact (FONSI) allowed for the implementation of an Integrated Bird Damage Management (IBDM) program to respond to requests for bird damage management (BDM) at municipalities, industrial sites, agricultural sites, and private land within Indiana to protect property, agriculture, natural resources, and human health and safety at these locations. The IBDM approach involves the use of the full range of BDM techniques, either singly or in combination, to resolve conflicts with birds. Those requesting assistance are provided with information regarding the use of effective non-lethal and lethal techniques. Lethal methods used or recommended by WS include shooting, trapping, toxicants, or euthanasia following live capture or trapping. Non-lethal methods used or recommended by WS include but are not limited to habitat alteration, chemical immobilization, repellents, fencing, barriers and deterrents, netting, capture and relocation, and harassment or scaring devices. BDM assistance is provided by WS when requested, where a need has been documented and upon completion of an *Agreement for Control* with the landowner/manager. All WS BDM actions comply with applicable Federal, State, and local laws.

WS monitors the impacts of its BDM actions annually to determine if the impacts of the proposed action are within the parameters analyzed in the EA. This annual monitoring includes a review of the number of animals taken during BDM, and a review of BDM methods to see if new methods are available that would require additional analysis in the EA. Review of Indiana WS' BDM activities indicated that there have been more requests for damage management involving pigeons (rock doves, *Columba livia*) and mourning doves (*Zenaida macroura*)) than anticipated in the EA. Additionally, a new BDM product, the chemosterilant nicarbazin (OvoControl-G), was approved by the United States Environmental Protection Agency on November 23, 2005, for use in the management of local populations of resident Canada geese (*Branta canadensis*). This amendment analyzes the impact of these changes in WS' BDM activities.

The EA discussed the need to manage bird damage to property and bird-related risks to human health and safety at airports in Indiana. This type of bird damage management was also addressed in the EA and FONSI, "Wildlife Damage Management at Airports in Indiana" (hereafter "airport EA", USDA 2002*b*). To avoid duplication of analysis and more clearly present the analysis of cumulative impacts of WS'

[1] The EA may be obtained from the State Director, USDA/APHIS/WS, 901 W. State St., Purdue University, West Lafayette, IN 47907-2089.

BDM activities, this amendment updates and replaces the analysis of bird damage management at airports provided in the airport EA.[2]

II. NEED FOR BIRD DAMAGE MANAGEMENT AT AIRPORTS

Birds and mammals frequent airports and their surrounding areas because these sites contain natural and man-made habitats that provide food, water, shelter and open spaces. The wildlife activity associated with these habitats often results in risks to aviation safety.

Collisions between aircraft and wildlife are a concern throughout the world because they threaten passenger safety (Thorpe 1996), result in lost revenue to airlines and costly repairs to aircraft (Linnell et al. 1996, Robinson 1996), and can erode public confidence in the air transport industry as a whole (Conover et al. 1995). While bird-aircraft strikes that result in human fatalities are rare, the consequences can be catastrophic. The worst strike on record for loss of human lives was in Boston in 1960 when 62 people were killed in the crash of an airliner which collided with a flock of European starlings (Cleary and Dolbeer 1999). More recently, 24 lives were lost when an E-3B "AWACS" aircraft struck a flock of Canada geese at Elmendorf, Alaska in 1995. It is more common for wildlife-aircraft strikes to result in expensive repairs, flight delays, or aborted aircraft movements than in loss of human life. Wildlife strikes result in millions of dollars in direct and indirect damages annually.

The collision of an animal with aircraft is commonly referred to as a "strike." A high percentage of bird strikes occur during peak migration periods, but dangerous situations can develop during any season. Aircraft are most vulnerable to bird strikes while at low altitudes, generally related to landing and taking off. Approximately 75% of strikes occur under 600 feet above ground level (Cleary et al. 2004), which is why management of the area immediately surrounding taxiways, runways, and runway approaches is important.

During the early days of aviation, when aircraft flew at slower speeds, birds had little difficulty avoiding aircraft. Bird strikes were infrequent, and when they did occur, damage was usually minimal. The first recorded strike occurred on April 3, 1912, during a low level flight near Long Beach, California, and involved a gull with a model EX Wright Pusher airplane. The impact broke a guy wire, causing a fatal crash.

With the introduction of jet aircraft, bird strikes became a serious threat and more costly problem. The rapid acceleration, increased speeds, and reduced noise of jet turbine and turbo-prop aircraft give birds and other animals far less time to react to approaching aircraft. Longer runways and more complete use of runways by jet aircraft also increases the likelihood of strikes. The energy released as a result of a high-speed aircraft/bird collision is tremendous, and can be particularly damaging to technologically advanced turbine engines that use lightweight, high speed mechanical parts (Blokpoel 1976). Experts within the USDA, the Federal Aviation Administration (FAA) and the U. S. Air Force expect the risk, frequency, and potential severity of wildlife-aircraft collisions to escalate over the next decade. This is due to increased air traffic, quieter 2-engine aircraft replacing three- or four-engine aircraft, and increases in population numbers of wildlife species commonly struck by aircraft. (Cleary et al. 2004, Dolbeer and Eschenfelder 2003).

[2] The airport EA also addressed mammal damage management at airports. Analysis of mammal damage and risks to human health and safety from mammals at airports in the Airport EA will be replaced by the new EA, "Mammal Damage Management in Indiana", which is available for public comment at the same time as this amendment.

Wildlife Services, in cooperation with the FAA, maintains an FAA Wildlife Strike Database (FAA National Wildlife Strike Database, http://wildlife-mitigation.tc.faa.gov). The database contains all reported wildlife strikes to all U.S. civil aircraft and to foreign aircraft carriers experiencing strikes in the U.S. Over the interval of 1990-2004, 28 Indiana civil airports recorded more than 300 wildlife strikes; of these 164 had identifiable remains (USDA 1998). These airports experienced strikes from gulls (5.5%), white-tailed deer (*Odocoilous virginiaous*) (1.4%), other mammals (0.27%), raptors (5.7%) waterfowl (5.5%) and other birds (22.4%) that include blackbirds (e.g., red-winged black birds (*Agelaius phoeniceus*) and brown-headed cowbirds *(Molothrus ater)*), European starlings (*Sturnus vugaris*), pigeons, killdeer (*Charadrius vociferus*) and mourning doves. This number is likely to be much greater since an estimated 80% of civil bird strikes go unreported (Cleary et al. 2005, Wright and Dolbeer 2005). In September 2004 a SAAB-340 was landing at an Indiana airport and flew into a flock of European starlings. The plane struck 11 birds and made a precautionary landing. Damage to the windshield and nose gear were evident, and resulted in approximately 2 hours of downtime. (Cleary and Dolbeer, 2004.).

Other adverse impacts from bird activity at airports include bird nests on aircraft and in aircraft engines; damage to landscaping, structures, aircraft, vehicles and equipment; and risks to human health and safety from large accumulations of bird droppings.

III. SCOPE

3.1 Actions Analyzed. The amended EA evaluates alternatives for WS involvement in bird damage management to protect property, agriculture, natural resources, and human health and safety at municipalities, industrial sites, agricultural sites, airports and private land within Indiana wherever such management from the WS program is requested.

3.2 Period for which this EA is Valid. Unless it is determined that an Environmental Impact Statement is needed, the amended EA will remain valid until WS determines that new needs for action or new alternatives having different environmental effects must be analyzed. At that time, this analysis will be reviewed and revised as necessary. This EA will be reviewed each year to ensure that it is complete and still appropriate to the scope of WS's BDM activities.

3.3 Site Specificity. The amended EA analyzes potential impacts of WS' BDM activities that could occur in municipalities, industrial sites, agricultural sites, and private land within Indiana. This EA analyzes the potential impacts of such efforts wherever and whenever they might occur. The EA emphasizes significant issues as they relate to specific areas whenever possible. However, the issues that pertain to the various types of bird damage and resulting management are the same, for the most part, wherever they occur, and are treated as such. The standard WS Decision Model (Slate et al. 1992) and WS Directive 2.105 is the routine thought process that is the site-specific procedure for determining methods and strategies to use or recommend for individual actions conducted by WS on the aforementioned sites (See USDA 1997, Chapter 2 and Appendix N for a more complete description of the WS Decision Model and examples of its application). Decisions made using this thought process will be in accordance with any mitigation measures and Standard Operating Procedures (SOPs) described herein and adopted or established as part of the decision.

IV. AUTHORITY AND COMPLIANCE

4.1 Wildlife Services Legislative Authority

WS is the Federal program authorized by law to reduce damage caused by wildlife (the Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 U.S.C. 426c)). The mission of the USDA/APHIS/WS program is to provide federal leadership in managing conflicts with wildlife. Wildlife Services' mission, developed through its strategic planning process (USDA 1999), is: 1) *"to provide leadership in wildlife damage management in the protection of America's agricultural, industrial and natural resources, and 2) to safeguard public health and safety."* WS recognizes that wildlife is an important public resource greatly valued by the American people. By its very nature, however, wildlife is a highly dynamic and mobile resource that can cause damage to agriculture and property, pose risks to human health and safety, and affect industrial and natural resources. WS conducts programs of research, technical assistance and applied management to resolve problems that occur when human activity and wildlife conflict.

Additionally, Memoranda of Understanding among WS and other governmental agencies also define WS responsibilities in wildlife damage management. For example, a Memorandum of Understanding between the FAA and WS recognizes WS role and expertise in providing wildlife hazard management assistance to the aviation community. It states, that the "FAA or the certificated airport may request technical and operational assistance from WS to reduce wildlife hazards."

4.2 United States Department of the Interior, Fish and Wildlife Service (USFWS)

The primary responsibility of the United States Department of the Interior, Fish and Wildlife Service (USFWS) is fish, wildlife, and plant conservation. While some of the USFWS's responsibilities are shared with other Federal, State, Tribal, and local agencies, the USFWS has special authorities in managing the National Wildlife Refuge System; conserving migratory birds, endangered species, certain marine mammals, and nationally significant fisheries; and enforcing Federal wildlife laws. The Migratory Bird Treaty Act (MBTA) gives the USFWS primary statutory authority to manage migratory bird populations in the U.S. The USFWS is also charged with implementation and enforcement of the Endangered Species Act of 1973, as amended and with developing recovery plans for listed species.

4.3 Indiana Department of Natural Resources Legislative Authority

The Indiana Department of Natural Resources (IDNR), under the direction of the Conservation Commission, is specifically charged by the General Assembly with the management of the state's wildlife resources. The primary statutory authorities include the protection, reproduction, care, management, survival, and regulation of wild animal populations regardless of whether the wild animals are present on public or private property in Indiana (IC 14-22-2-3).

V. ALTERNATIVES FOR BIRD DAMAGE MANAGEMENT

5.1 Alternatives

The EA developed and analyzed four alternatives for bird damage management in Indiana. A detailed discussion of the alternatives and specific bird damage management techniques is

provided in the EA. The EA also provided a discussion of an additional alternative, "Technical Assistance Only," that was considered but not analyzed in detail. The following is a discussion of the alternatives analyzed in detail.

5.1.1 Alternative 1 – Implement a Federal BDM Program /Integrated Bird Damage Management (Proposed Action/No Action).

The proposed action is to continue the current WS program that respond to requests for BDM at municipalities, industrial sites, agricultural sites, airports, and private land within Indiana to protect property, agriculture, natural resources, and human health and safety at these locations. An IBDM approach would be implemented which would allow use of any legal technique or method, used singly or in combination, to meet request or needs for resolving conflicts with birds affecting the aforementioned properties (EA Appendix B). Individuals requesting assistance would be provided with information regarding the use of effective non-lethal and lethal techniques. Lethal methods used or recommended by WS may include shooting, trapping, toxicants, or euthanasia following live capture by immobilization drugs or trapping. Non-lethal methods used or recommended by WS may include habitat alteration, chemical immobilization, repellents, fencing, barriers and deterrents, netting, capture and relocation, and harassment or scaring devices. In many situations, the implementation of non-lethal methods such as habitat alteration, structural modifications, and exclusion-type barriers would be the responsibility of the property managers to implement. BDM by WS would be allowed on the aforementioned sites, when requested, where a need has been documented and upon completion of an Agreement for Control. All management actions would comply with appropriate Federal, State, and local laws.

5.1.2 Alternative 2 - Non-lethal BDM Only, By WS.

This alternative would require WS to only use and recommend non-lethal methods to resolve bird damage problems. Requests for information regarding lethal management approaches would be referred to IDNR, USFWS, local animal control agencies, or private businesses or organizations. Individuals might choose to implement WS' non-lethal recommendations, implement lethal methods or other methods not recommended by WS, contract for WS operational assistance with non-lethal methods, use contractual services of private businesses, or take no action. Currently, the toxicant DRC-1339 and the bird sedative alpha-chloralose are only available for use by WS employees. United States Drug Enforcement Agency (DEA) regulated immobilizing/euthanasia drugs are available only to licensed veterinarians or other authorized users such WS personnel. Therefore, use of these chemicals by private individuals would be illegal. Under this alternative, alpha-chloralose or other approved capture drugs would be used by WS personnel to capture and relocate birds. WS would be unable to use the toxicant DRC-1339 under this alternative. However, a similar product, Starlicide, would be available to licensed pesticide applicators, but its use would be limited to agricultural applications/sites. Appendix B in the EA describes a number of non-lethal methods available for use by WS under this alternative.

5.1.3 Alternative 3 - Lethal BDM Only, by WS.

This alternative would require WS to only use and recommend lethal methods to resolve bird damage problems. Technical assistance would include making recommendations to the USFWS and IDNR regarding the issuance of permits to resource owners to allow

them to take birds by lethal methods. Requests for information regarding non-lethal management approaches would be referred to IDNR, USFWS, local animal control agencies, or private businesses or organizations. Individuals might choose to implement WS' lethal BDM recommendations, implement non-lethal methods or other methods not recommended by WS, contract for WS direct control services, use contractual services of private businesses, or take no action. Appendix B in the EA describes a number of lethal methods available for use by WS under this alternative. Under this alternative, WS could still use the non-lethal bird capture methods discussed in Appendix B, but all birds would have to be euthanized after capture.

5.1.4 Alternative 4 - No Federal WS BDM.

This alternative would eliminate Federal WS involvement in BDM at municipalities, industrial sites, agricultural sites, and private land within Indiana. WS would not provide direct operational or technical assistance and requesters of WS services would have to conduct their own BDM without WS input. Requests for information would be referred to IDNR, USFWS, local animal control agencies, or private businesses or organizations. Individuals might choose to conduct BDM themselves, use contractual services of private businesses, or take no action. DRC-1339 and alpha-chloralose are only available for use by WS employees. Therefore, use of these chemicals as well as U.S. Drug Enforcement Agency controlled substances by private individuals would be illegal. However, as with Alternative 2, Starlicide, would be available to licensed pesticide applicators, but its use would be limited to agricultural applications/sites.

5.2 Use of Nicarbizin as a Technique for Managing Damage Caused by Canada Geese.

Many times, the bird species that cause problems are ones that have adapted to, and thrive in the presence of people. Canada geese that have formed resident year-round populations fit this depiction and are considered overabundant in many areas of the US, particularly in suburban and urban areas (Conover and Chasko 1985, Hindman and Ferrigno 1990, Ankney 1995). The primary method for controlling Canada goose population growth in urban and suburban areas has been to oil or addle eggs (Cummings et al., 1997). Egg oiling techniques were successfully investigated and improved by the USDA, APHIS, WS, National Wildlife Research Center (NWRC), which resulted in a new label for this use under Section 25b of the Federal Insecticide, Fungicide and Rodenticide Act in 1996. However, to successfully oil or addle eggs, each individual nest must be located and monitored until the goose has finished laying eggs and begins to incubate, at which point the eggs are oiled or addled. This can be difficult because Canada geese often nest in areas with limited access, including islands in ponds or rivers, areas of thick brush or grass.

The NWRC has been instrumental in the development and registration of a new product, nicarbazin (OvoControl-G™; CAS 330-95-0/4,4=-dinitrocarbanilide (DNC, CAS 587-90-6)/ 2-hydroxy-4,6-dimethylpyrimidine (HDP, CAS 108-79-2) (1:1)), which is an infertility agent for Canada geese in urban areas. Nicarbazin is available to certified pesticide applicators and is not restricted to use by WS. Use of baits containing nicarbazin would allow the numbers of small to moderate sized groups of Canada geese to be controlled by reducing the hatchability of eggs laid by treated geese without requiring the location of each individual nest to be determined. In a field study conducted in Oregon (Bynum et al. 2005), use of nicarbazin reduced hatchability of eggs 35.6% ($P = 0.062$). When considering the success of individual nests at sites rathen than flocks as a whole, percent hatchability was significantly reduced 50.7% ($P < 0.001$). The high degree of variability among Canada geese in their movement patterns, nesting and habitat use complicates

use of this product (Vercauteren and Marks 2004). The variability in goose behavior can make it difficult to get to get the required doses to the geese (see below). Under current label guidelines, the cost for nicarbazin (Ovocontrol®) applications exceeds the cost of other control methods (Tim Julien, President, Nuisance Wildlife Control Operators Association, pers. comm. 2006, Cooper and Keefe 1997) until the goose population reaches a critical threshold of approximately $\geq$ 80 birds (Caudell and Shwiff 2006).

Nicarbazin is thought to induce infertility in birds by two main mechanisms. Nicarbazin may disrupt the membrane surrounding the egg yolk, resulting in intermixing of egg yolk and white (albumin) components, creating conditions in which the embryo cannot develop. Nicarbazin may also inhibit incorporation of cholesterol into the yolk, a step that is necessary for yolk formation, thereby limiting energy for the developing embryo. If the yolk does not provide enough energy, the embryo will not completely form and the egg will never hatch. Nicarbazin bait must be consumed for several days to achieve blood levels that affect the hatchability of eggs that are forming. Nicarbazin is undetectable in the plasma of Canada geese, mallards, and chickens by 4-6 days after consumption of nicarbazin bait has stopped. The levels of active ingredient in the blood are reduced by half within one day after bait consumption stops. If the level of active ingredient falls by approximately one half its peak levels, no effects on egg formation can be seen. By two days after bait consumption has stopped, no effects on the egg being formed are seen. Consequently, the bait must be offered to the geese each day of the nesting period for best impact on reproduction.

Baits containing nicarbazin would be offered at centralized locations when the Canada geese are beginning to nest, thus treating several breeding pairs of geese in the area at the same time without having to locate individual nests. Signs will be posted at the treatment sites, warning the public of the presence of treated baits.

5.3 Standard Operating Procedures

The WS program, nationwide and in Indiana has developed SOPs for its activities that reduce the potential impacts of these actions on the environment. The following is a list of new SOPs relating to the use of nicarbazin.

Table 1. New Standard Operating Procedures that could be implemented under the alternatives considered in the EA and amendment.

Mitigation Measures	Alternatives			
	1	2	3	4
Pretreatment evaluation of cost effectiveness	x	x		
Pretreatment evaluation human health & safety	x	x		
Pretreatment evaluation of non-target impacts	x	x		
Pretreatment consultation with IDNR	x	x		
Post warning signs during treatment	x	x		
Monitoring of bait sites until product is consumed	x	x		
Removal of unconsumed bait	x	x		

VI. ENVIRONMENTAL IMPACTS

The following analysis is intended to update sections of the environmental impact analysis in the EA and only includes information on impacts which have changed since the EA was completed.

6.1 Impacts on Target Species

For all species except mourning doves and pigeons, lethal take has been within the levels anticipated and analyzed in the EA. The changes in impacts on mourning doves and rock doves would only apply to Alternative 1 and are addressed as such. Nicarbazin would only be used to reduce/stabilize the number of urban/suburban resident Canada geese at specific sites in Indiana. WS would be able to use nicarbazin under Alternatives 1 and 2. Nicarbazin would also be available to any other certified pesticide applicator under each of the alternatives. Impacts of nicarbazin use are likely to be similar for any of the alternatives.

Mourning Doves - During FY 04 and 05, WS killed 50 mourning doves per year. This is over the EA's predicted take of 20 mourning doves per year. United States Geological Survey Breeding Bird Survey (BBS) data provided by Sauer et al. (2005) for 1980-2004 indicate that mourning dove populations in the state and USFWS Region 3 have been relatively stable to slightly increasing (0.6%/year, $P<0.09$ and 0.8, $P<0.01$ respectively), and have been slightly decreasing nationwide (-0.3, $P=0.01$). WS anticipates that the take of mourning doves will not exceed 100 birds/year. Because WS' take of mourning doves only occurs in an extremely small portion of the area in Indiana (usually only at airports), the number of animals taken is small, BBS data indicate that the mourning dove population in the state and region is stable to increasing and WS' take is within limits permitted by the USFWS, we conclude that increasing the maximum allowed take of mourning doves from 20 birds per year to 100 birds per year will not adversely impact the mourning dove population (USDA 1997 Revised – Impact Evaluation Procedures).

Pigeons –Feral domestic pigeons (rock doves) are not native to North America. Breeding Bird Survey trend data for 1980 to 2004 show annual decreases for Indiana (-2.9, $P=0.02$), the USFWS Region 3 (-2.8%/year, $P<0.01$), and the U.S. (-1.4%/year, $P<0.01$), respectively (Sauer et al. 2005). In 2005, the lethal take of pigeons exceeded the maximum of 250 birds/year predicted and analyzed in the EA. Federal or state law does not protect the species. Any BDM involving lethal control actions by WS for this species would be restricted to isolated, individual sites, or communities. In those cases where feral domestic pigeons are causing damage or are a nuisance, complete removal of the local population could be achieved. This would be considered to be a beneficial impact on the human environment by affected property owner or administrator. However, some individuals who experience aesthetic enjoyment of pigeons may consider major population reduction in some localities a negative impact. Although regional population impacts would be minor, even if significant regional or nationwide reductions could be achieved, this would not be considered an adverse impact on the human environment because the species is not part of native ecosystems. Given that WS' removal of pigeons is restricted to local sites and to small, insubstantial percentages of overall populations, and that pigeons are and introduced species, increasing the maximum number of pigeons that could be taken per year to 2,000 should not have an adverse impact on the human environment.

Table 2. Birds killed, dispersed or freed during WS BDM efforts in Indiana. With the exception of European starlings and pigeons, all take occurred during efforts to reduce wildlife damage and hazards to human health and safety at airports. The proportion of all European starling and pigeon take that occurred during damage management efforts at airports is provided in parenthesis

Species	2003		2004		2005	
	Dispersed/ Freed	Killed	Dispersed/ Freed	Killed	Dispersed / Freed	Killed
European Starlings	7,060 (7,060)	6,999 (235)	5,750 (3,560)	7,660 (405)	5,000 (5,000)	10,135 (90)
House Sparrows	26	0	26	67	200	46
Pigeons (rock doves)	0	164 (164)	0	203 (200)	0	436 (50)
Blackbirds Mixed Species	14,327	9	10,542	0	10,492	0
American Crows	34	2	25	0	15	0
Mourning Doves	432	10	230	50	250	50
Mallards	166	8	100	15	87	15
Canada Geese	50	0	150	20	150	15
Grackles	29	1	29	1	14	1
Gulls	105	4	105	4	85	11
Great Blue Herons	14	4	14	2	18	2
Hawks /Kestrels	63	0	60	5	51	5
Killdeer	55	5	55	5	75	5
Horned Larks	257	3	257	3	220	3
Purple Finches	10	0	10	0	0	0
Purple Martins	0	0	0	0	0	0
Meadowlarks	145	6	145	6	140	6
Nighthawks	0	0	0	0	0	0
Owls	0	0	2	0	2	0
American Robins	0	0	0	0	0	0
Swallows – Tree, barn, & cliff.	35	2	35	2	40	2
Turkey Vultures	10	0	31	4	18	0

Canada Geese - Canada geese are a large waterfowl that are found throughout North America. Breeding Bird Survey trend data from 1980 to 2004 indicate the Canada goose population has been growing in Indiana (12.5%/year, $P<0.01$), the central BBS region (9.7%/year, $P < 0.01$), and nationally (6.9%/year, $P<0.01$; Sauer et al. 2005). Canada geese are a widespread occupant of open areas, ponds and wetlands. Their primary diet is vegetative matter that includes items such as grass, corn, and soybeans. Canada geese are also very adaptive to urban settings and often thrive in areas such as public parks and retention ponds. WS' lethal take of Canada Geese has not exceeded levels predicted and analyzed in the EA. However the new BDM method, nicarbazin, would temporarily reduce/eliminate reproduction in geese that are eating the bait. Therefore, we are revising the analysis of impacts of the preferred alternative on Canada geese.

Nicarbazin is a reproductive inhibitor which can be used to maintain or reduce local populations of Canada geese. As with lethal methods, a permit from the USFWS is required to use this

method. Used exclusively, nicarbazin would likely take years to reduce a local goose population because Canada geese are relatively long-lived (Klimkiewicz 2000), and because the method is unlikely to be 100% effective (Binam et al. 2005; Vercauteren and Marks 2004). In situations where there is ongoing damage it may be necessary to first reduce the number of geese present at the site and then use the nicarbazin to keep the local population at the reduced levels. In areas where the population is currently low and conflicts are tolerable, nicarbazin may be used to maintain the local population at current levels. Over the long term, use of nicarbazin may decrease the need for lethal removal of geese.

6.2 Effects on Nontarget Species Populations Including Threatened or Endangered Species

The EA concluded that there would be no adverse affects on non-target wildlife species from WS program activities. No nontarget wildlife or threatened and endangered (T&E) species were taken since the EA was completed in 2002.

Two new species, the rayed bean (*Villosa fabalis)* and sheepnose mussel (*Plethobasus cyphyus*), have been added to the U.S. Fish and Wildlife Service's T&E list as candidate species since the EA was completed. Both species are aquatic organisms. The WS actions proposed in this EA do not alter aquatic environments, so the current program will have no impact on these species. However, WS does occasionally make recommendations that the airport manager alter/remove aquatic habitat on or near airports even though WS does not conduct the work. When providing technical assistance recommendations that include habitat management, WS also advises the property owner/manager that they will have to assess risks to State and Federally listed species and, if these species are present, consult with the appropriate State or Federal Agency. A review of the Indiana Department of Natural Resource's T&E species list revealed that two birds have been added to the state endangered species list since the April 17, 2002 signing of the Decision/FONSI, the black rail (*Laterallus jamaicensis*), and the common moorhen (*Gallunula chlorophus*). The current program will have no effect on these species because they do not occur on airports or the other areas where WS conducts BDM activities. No adverse impacts are expected for any of the T&E species on the State or Federal lists.

Nicarbazin baits are to be used at sites, office complexes, golf courses, residential communities, and municipalities. Although it is possible that other egg-laying species such as birds, reptiles, amphibians, fish, and invertebrates, could feed on the baits, which could reduce their egg-laying potential, the sites where the bait would be used are not as conducive to attracting many species of egg-laying animals. These areas are also places where T&E species are typically not found. Birds in urban and suburban habitats are typically common species that have adapted to the presence of man. Only a few other species are expected to consume the baits, primarily mallards, domestic waterfowl, and possibly gulls, crows, and pigeons. In an Oregon field study, the primary nontarget avian species to consume the bait were American crows, ravens and mallards. However, because most bait consumption by non-target species is expected to be occasional or intermittent and the bait must be consumed regularly throughout the breeding season to inhibit reproduction, nicarbazin is not expected to have any significant impact on these species. Additionally, the size of the baits will prevent small birds and songbirds from eating the baits; small pieces of bait will be removed during the manufacturing process by sifting through screens. Studies on waterfowl in the Fort Collins, Colorado area have shown that most mallards will not eat the bait; they pick up the bait, manipulate it with their bill and then spit it out. However, mallards that are use to being fed by people could eventually eat the bait after the Canada geese on site began eating the bait. Since Canada geese will typically aggressively protect their food sources, they are expected to chase away any other birds attempting to eat the bait offered. WS

will also monitor the site prior to and during bait application to ensure that non-target species access to the site is limited to nonexistent and that there are no State or Federally listed species that could consume the bait present at the site. Unconsumed bait will be picked up after the bait application period.

Canada geese typically nest earlier in the year than most other waterfowl species that would consume the bait and before many songbirds. Nicarbazin bait will be offered as early as February and will end in early April. Nicarbazin bait must be consumed for several days to achieve blood levels that affect the hatchability of eggs that are forming. Since most waterfowl do not begin to nest until at least May, no effects on the hatchability of eggs of non-target waterfowl that do consume bait are expected as bait exposure will stop before their nesting season is beginning.

Studies of the effects of nicarbazin on animals other than birds that lay eggs have been limited to snakes. When brown tree snakes were treated with nicarbazin, the number of eggs laid, the hatchability of the eggs, and the health of the offspring were not affected by treatment. It is possible, but not probable, that other egg-laying species could feed on the bait such as turtles. However, WS will monitor the site prior to and during bait application and will remove the bait and/or change the bait application system to avoid exposure to nontarget species.

Toxicity studies in birds and mammals given short and long-term doses of nicarbazin show minimal effects. The volume of OvoControl-G bait that would have to be consumed by nontarget birds and mammals precludes them from being killed by exposure to the bait. For example, a rat would have to consume over 2.2 pounds of the OvoControl-G bait in a singe feeding to reach the lethal dose required to kill 50% of the rats to consume that level of bait (LD_{50}). Extrapolations from data on chickens indicate that crows would have to eat 1.4 lbs of bait each day for 84 days before they would reach the LD_{50} (Binam et al. 2005). Mammalian predators of geese that have eaten bait could also be exposed to the bait. However, calculations of a worst case scenario by Binam et al. (2005) indicate that a coyote would have to eat over 40 geese in a single day in order to reach the acute (one dose) LD_{50} for nicarbazin determined for dogs weighing 25 lbs. or over 13 geese per day for 163 days to reach the chronic (repeated dose) LD_{50}.

Based on the fact that WS did not take any nontarget species, the provisions for the use of nicarbazin that reduce risks to nontarget species and because of the determination above relative to new state and federally listed T&E species, this alternative is not expected to adversely impact non-target species populations.

6.3 Economic Losses to Property as a Result of Bird Damage

Many property owners and managers are concerned with the economic cost associated with damage caused by birds to property. Birds can cause severe damage or total loss to property, structural damage to buildings, damage to equipment, manufactured products and food, and obstruction or damage to water control structures. The IBDM alternative selected in the EA's Decision/FONSI (Alternative 1) allows for the use of the full range of lethal and non-lethal BDM methods and has the greatest potential of successfully reducing the risk of bird damage. The proposed increase in the maximum number of pigeons and mourning doves would enable WS to continue to provide effective BDM assistance. If the current limits are maintained, WS may have to use methods that are less than optimal to resolve damage management situations that may occur after the yearly limit on take has been reached.

The addition of nicarbazin as a management option would give WS another alternative that could be used when designing BDM strategies. However, the addition of nicarbazin is anticipated to be

an alternative means of successfully resolving conflicts with urban and suburban Canada geese, but is not necessarily anticipated to be more effective than current management strategies.

6.4 Impacts on Human Health and Safety

Even though the number of pigeons and mourning doves to be taken could increase, with the exception of nicarbazin discussed below, the methods used to take these species would not change. The proposed increase in take of pigeons and mourning doves would allow WS to continue to provide effective assistance in reducing risks to human health and safety from birds. If the current limits are maintained, WS may have to use methods that are less than optimal to reduce risks to human health and safety from birds. This may be particularly undesirable at airports where WS currently does most of its BDM.

Signs or posters informing people of the presence of bait will be posted at various locations around the study site to increase awareness of the presence of the nicarbazin bait. WS will be monitoring the site before an during bait application and can also advise people to not eat the bait. There is a remote chance that a child might pick up and consume a limited number of pieces of the bait. If a child consumes the nicarbazin bait, no adverse effects are expected, although the bait is very hard and may pose a slight choking hazard to very small children. The untreated bait has no taste or a slight corn flour taste to humans and would not appeal to humans/children. The treated bait has a mild astringent quality and would cause a Acotton-mouth@ feeling and would provide a negative stimulus to children for continued consumption

The FDA has a rigorous evaluation system to determine the human food safety of any product used in food animals. It has been determined that nicarbazin is safe in chicken meat at a level of 4 milligrams per kilogram with a human consumption of 1 pound (500 grams) of meat per day by a 120 pound (60 kilogram) human over a lifetime (US Department of Health and Human Services, Public Health Service, FDA, Center for Veterinary Medicine Guidance Document Guideline No. 3. General Principles for Evaluating the Safety of compounds Used in Food-Producing Animals Part IV. Guideline For Establishing A Tolerance changed to Guideline For Establishing A Safe Concentration; Code of Federal Regulations, Title 26, Volume 6, Parts 500 to 599, 2003; Code of Federal Regulations, Title 21, Volume 6, 2003). It is not anticipated that humans will consume geese treated with nicarbazin prior to the hunting season in the fall, which is well beyond the FDA recommended 4-day withdrawal period for treatment of chickens with nicarbazin. However, there is a slight chance that a treated goose could be illegally consumed by a human during or immediately following treatment with nicarbazin bait during the study. Based on calculated lifetime exposures, no effect on humans consuming meat with nicarbazin residues is expected even if meat is consumed prior to the 4-day withdrawal period.

Based on the analysis in the EA and the above discussion of nicarbazin, the proposed action, including the use of nicarbazin, will not adversely impact human health and safety and will better enable WS to respond to the need to protect human health and safety from risks associated with birds.

6.5 Effects Human Affectionate-Bonds with Individual Birds and on Aesthetic Values of Bird Species

Some people who routinely view or feed individual birds such as geese and feral pigeons are disturbed by removal of such animals under the current program and would also be disturbed by the proposed increases in the lethal take of pigeons and mourning doves. However, lethal control actions would still generally be restricted to local sites and to small, insubstantial percentages of

overall populations. Therefore, the species subjected to limited lethal control actions would remain common and abundant and would therefore continue to remain available for viewing by persons with that interest.

The use of nicarbazin would likely decrease the need for lethal goose removal and would probably be more acceptable to people who enjoy the presence of geese that lethal removal of birds. However, in situations where the goose problem is related to high numbers of geese at a site some removal of geese may still be necessary. Used exclusively, nicarbazin would likely take years to reduce a local goose population because Canada geese are relatively long-lived (Klimkiewicz 2000), and because the method is unlikely to be 100% effective. It may be necessary to first reduce the number of geese present at the site and then use the nicarbazin to keep the local population at the reduced levels. In this instance, use of nicarbazin will not prevent the initial removal of geese that some people find objectionable, but may still be a preferable long-term solution because it would reduce the need for future goose removal.

6.6 Effects on Aesthetic Values of Property Damaged by Birds

The fecal contamination associated with high numbers of birds at parks and other public areas is considered by some to be an adverse impact on their aesthetic enjoyment of these sites. The proposed increase in the maximum number of pigeons and mourning doves would enable WS to continue to provide effective BDM assistance. If the current limits are maintained, WS may have to use methods that are less than optimal to resolve damage management situations that may occur after the yearly limit on take has been reached.

The addition of nicarbazin as a management option would give WS another alternative that could be used when designing BDM strategies. However, the addition of nicarbazin is anticipated to be an alternative means of successfully resolving conflicts with urban and suburban Canada geese, but is not necessarily anticipated to be more effective than current management strategies.

6.8 Humaneness and Animal Welfare Concerns of Lethal Methods Used by WS

As discussed in the EA, some individuals believe that the use of lethal BDM methods is inhumane and inappropriate. These individuals will also object to the increase in lethal take of pigeons and mourning doves.

Most people are likely to approve of the use of nicarbazin for goose damage management because it is likely to reduce the need for lethal goose removal. However, there are some individuals who perceive the use of reproductive control in animals as morally unacceptable and an inappropriate manipulation of natural systems. These people are likely to disapprove of the use of nicarbazin.

6.9 Cumulative Impacts

No significant cumulative environmental impacts are expected from the proposed increases in the number of pigeons and mourning doves that could be taken or the inclusion of nicarbazin as a damage management technique. No risk to public safety is expected when WS' services are provided and accepted by requesting individuals in Alternatives 1, 2, and 3, because trained and experienced wildlife biologists/specialists would conduct and recommend BDM activities. Although some persons will likely be opposed to the proposed increased in take of pigeons and mourning doves, and/or the use of nicarbazin to protect property and human health and safety at municipalities, industrial sites, agricultural sites, and private land within Indiana, the analysis in

this EA indicates that WS Integrated BDM program will not result in significant cumulative adverse impacts on the quality of the human environment.

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VIII. ACRONYMS

APHIS	Animal and Plant Health Inspection Service
BBS	U.S. Geological Survey, Breeding Bird Survey
BDM	Bird Damage Management
EA	Environmental Assessment
FAA	Federal Aviation Administration
FONSI	Finding of No Significant Impact
IBDM	Integrated Bird Damage Management
IDNR	Indiana Department of Natural Resources
MBTA	Migratory Bird Treaty Act
NWRC	USDA, APHIS, WS, National Wildlife Research Center
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
USDA	United States Department of Agriculture
USDEA	United States Drug Enforcement Agency
USFWS	United States Department of the Interior, Fish and Wildlife Service
WS	Wildlife Services

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